

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
3 February 2005 (03.02.2005)

PCT

(10) International Publication Number  
**WO 2005/011283 A1**

(51) International Patent Classification<sup>7</sup>: **H04N 7/26, 7/36**

(21) International Application Number:  
PCT/US2004/017176

(22) International Filing Date: 28 May 2004 (28.05.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
60/485,891 9 July 2003 (09.07.2003) US

(71) Applicant (for all designated States except US): **THOMSON LICENSING S.A.** [FR/FR]; 46 Quai A. Le Gallo, F-92100 Boulogne-Billancourt (FR).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **BOYCE, Jill, MacDonald** [US/US]; 3 Brandywine Court, Manalapan, NJ 07726 (US). **LLACH, Joan** [ES/US]; 25 C Chestnut Court, Princeton, NJ (US).

(74) Agents: **TRIPOLI, Joseph, S.** et al.; c/o Thomson Licensing Inc., Two Independence Way, Suite 200, Princeton, NJ 08540 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

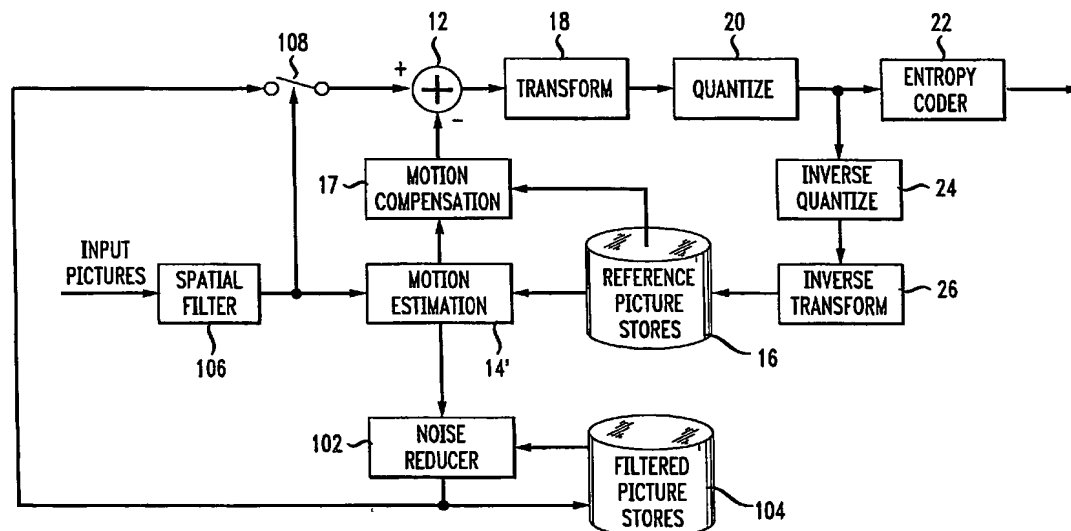
(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: VIDEO ENCODER WITH LOW COMPLEXITY NOISE REDUCTION



(57) Abstract: Noise reduction is achieved during video encoding with low complexity by making use of the motion estimation decision sets for noise reduction. Motion estimation is performed  $N$  times (where  $N$  is integer) on each macroblock to yield  $N$  sets of motion estimation data, each set including a reference picture index and a motion vector. Typically, although not necessarily, each set of motion estimation data makes use of a different reference picture. For each macroblock, the  $N$  sets of motion estimation data are used to create a noise-reduced macroblock, which is then encoded.